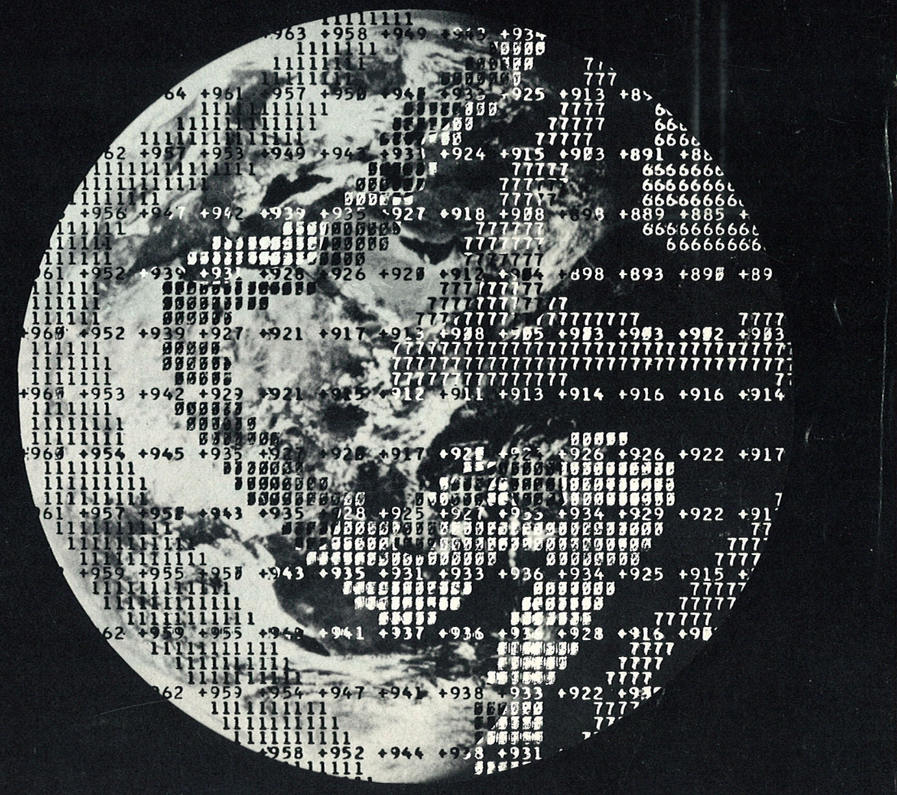
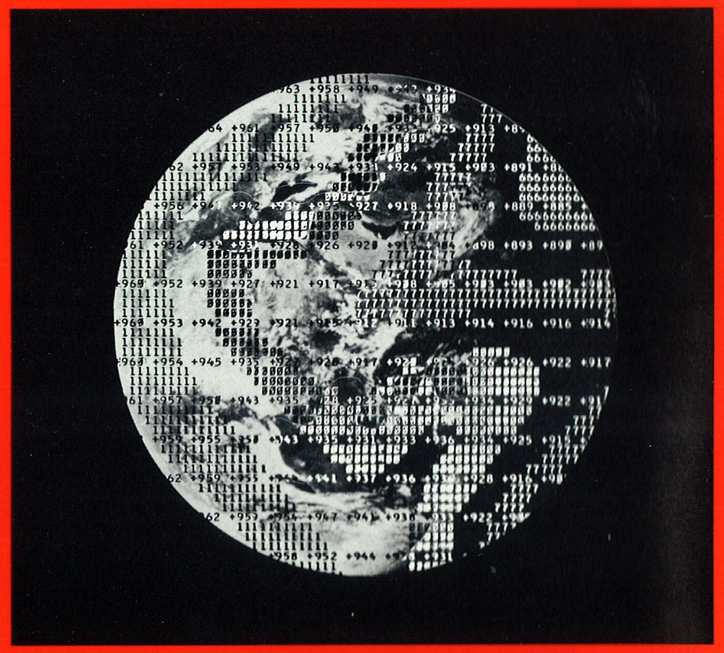
A UNITED STATES DEPARTMENT OF COMMERCE PUBLICATION

THE ENVIRONMENTAL DATA SERVICE
Services and Publications



U.S. DEPARTMENT OF COMMERCE

Environmental Science Services Administration



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Data means information,

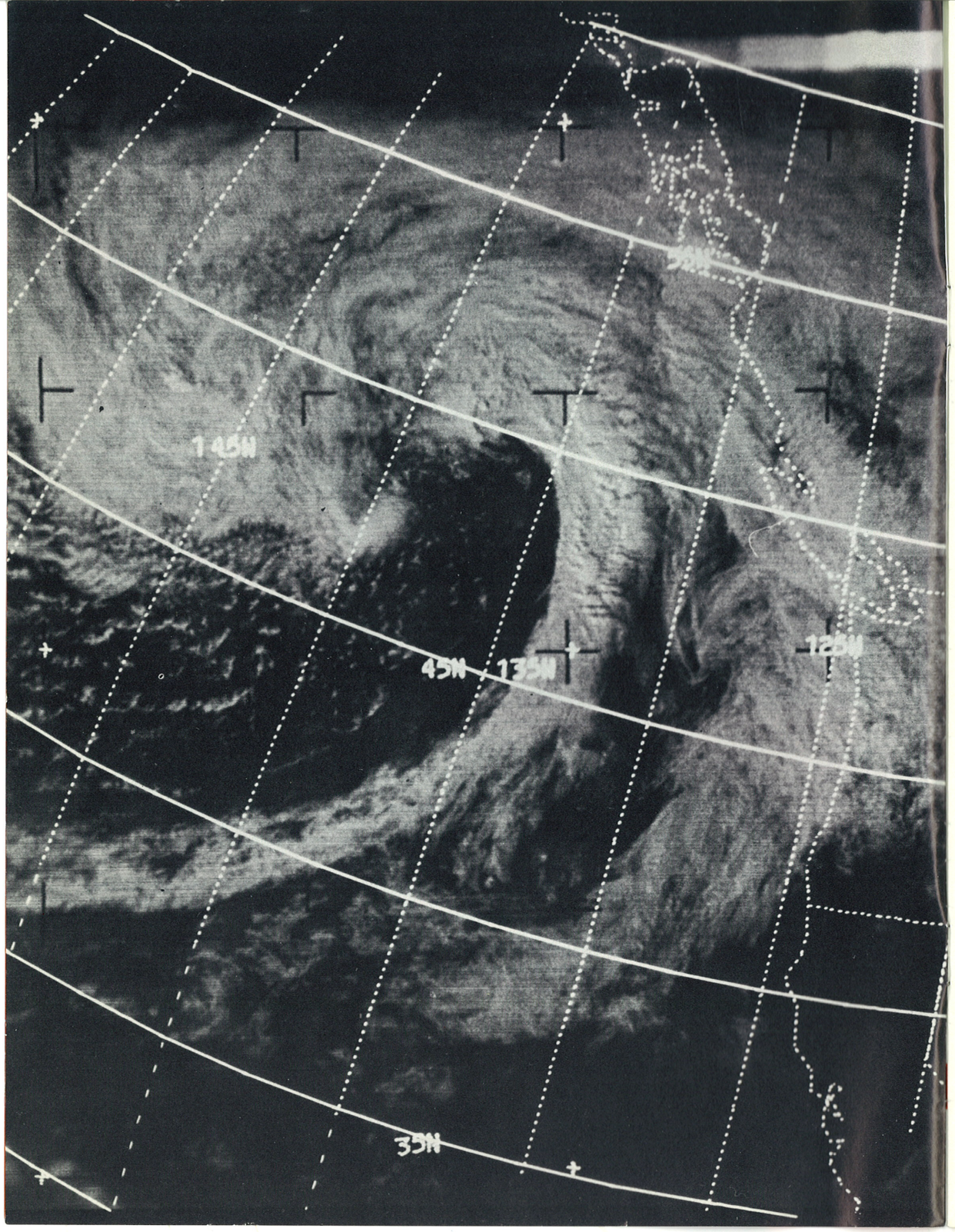
a way of seeing how something was at a given time and place. ESSA, the Environmental Science Services Administration, uses data gathered from the earth, sea, sun, and atmosphere to describe and predict the state of man's physical environment. Other individuals and organizations acquire similar data, to serve their distinct objectives. Once harvested and used, this information becomes history in the hands of the archivists and statisticians and scientists of ESSA's Environmental Data Service, an international focus for man's description of the physical world.

Environmental data collection in the United States goes back to the Colonies and such prominent "climatologists" as Benjamin Franklin and Thomas Jefferson. But it was the combination of post-World War II technology and the International Geophysical Year (IGY) of 1957-1958 that provided the impetus that has made data archiving and dissemination the mountain-moving job it is today.

During the IGY, World Data Centers for the various geophysical disciplines were established in several countries to coordinate this international exchange of environmental data. Those in the United States are designated World Data Centers "A" to distinguish them from centers in other countries. World Data Centers A for seismology, gravity, tsunamis, geomagnetism, meteorology, nuclear radiation, ionosphere and airglow, cosmic rays, aurorae, and solar observations are presently collocated by discipline at several of ESSA's five environmental data centers.

Besides its data center activities, the Environmental Data Service (EDS) provides information through its headquarters Office of Data Information, and through an extensive Field Services Program. Under this program, State climatologists offer a State-based consultant service in the application of climatology—and, to a limited degree, oceanography, seismology, geomagnetism, and aeronomy—to the environmental problems of university research groups, State and municipal agencies, local industry, and the general public. In addition, EDS' Laboratory for Environmental Data Research seeks new applications of archived data to environmental problems.

The information resources of the Environmental Data Service are archived according to discipline in the National Climatic Center, the Seismological Data Center, and the Geodetic Data Center in Asheville, N.C.; the Geomagnetic Data Center in Rockville, Md.; and the Aeronomy and Space Data Center in Boulder, Colo. The following sections describe the products and services of these centers.



The National Climatic Center

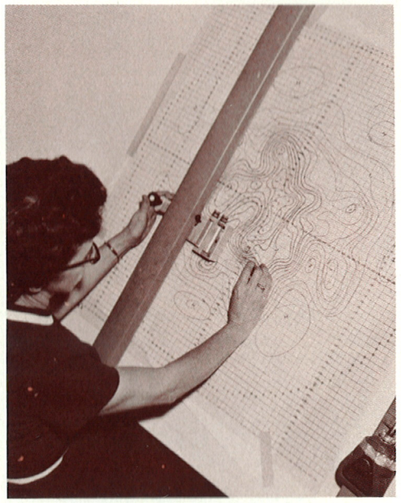
The National Climatic Center (formerly the National Weather Records Center) in Asheville, N.C., is the collection center and custodian of all United States weather records and is the largest data center in the Environmental Data Service. World Data Center A for Meteorology and Nuclear Radiation is housed in the National Climatic Center (NCC).

NCC holdings range from the contents of 18th century journals to the meteorological data currently collected by Federal agencies, as well as weather observations from foreign countries and from cooperative programs with State and local agencies. NCC currently receives more than 100 million observations a year from a global network of surface and upper air stations.

Approximately 70 million original manuscript observation sheets and autographic traces are on hand, and about 2½ million more are added annually. Most of these have been digitized on seven- and nine-channel magnetic tapes for machine processing, and many of the original sheets have also been microfilmed. About half of the 565 million data punched cards on file are also on microfilm, and can be converted to magnetic tape for computer processing when needed.

The NCC archives contain about 11,000 reels of radarscope pictures and 6,000 reels of satellite cloud photographs and analyses (radiation data and computer-derived products from weather satellites are retained on magnetic tape). Computer printouts of 16,000 machine tabulations prepared to answer special user requests are also available.

Each year, NCC mails some 1,300,000 copies of its climatological publications to subscribers, while an average of 250,000 additional copies are distributed to answer requests for climatological data. Information concerning these and other publications is given on page 17.



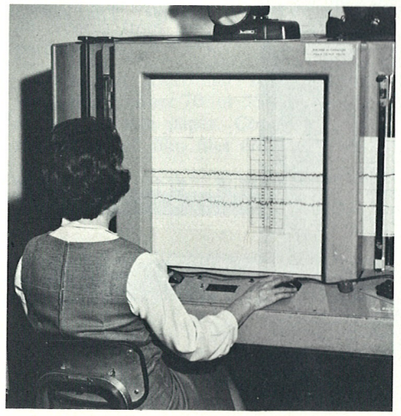
Activities at the National Climatic Center are multimedia. At left, an operator wearing dirt-free overalls rewinds film in the Center's clean room, where microfilm weather records, satellite data, and radar film strips are processed and duplicated. Above, northern hemisphere data are retrieved and plotted with a large-area record reader. Increasingly, climatic data are accommodated to electronic computers. At right, for example, analog records from tower-mounted wind sensors are converted to digital data, ultimately to be processed through the joint National Climatic Center–Air Weather Service computer facility in Asheville, part of which is shown at far right.

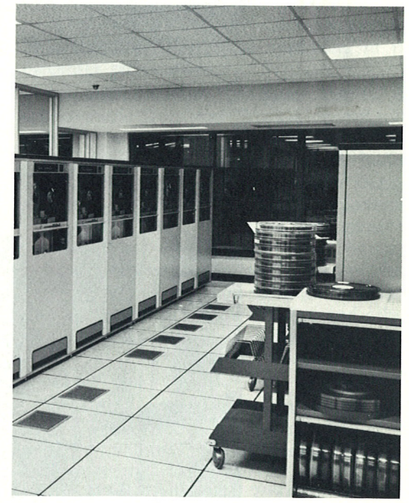
NCC also helps users solve specific climatological problems by furnishing data in the particular form and quantity needed, preparing special tabulations or summaries on request at the expense of the user. NCC personnel and the user decide on content and specifications, but nongovernment users who also require assistance in interpreting and applying climatological information to their specific problem are referred to a private meterological consultant.

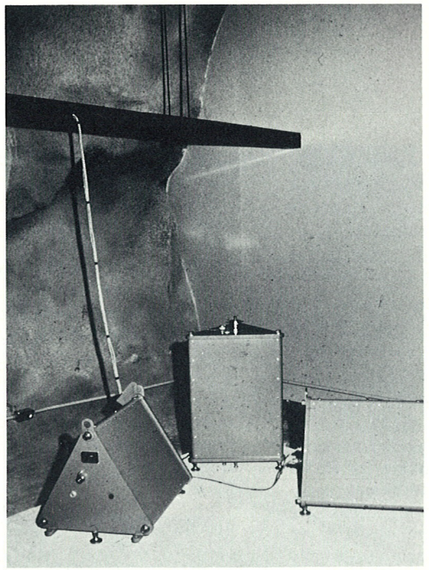
The National Climatic Center often conducts major climatological studies for ESSA components and other Government agencies. Reports on these investigations are frequently published and are available to anyone at the cost of reproduction, usually just a few cents a page.

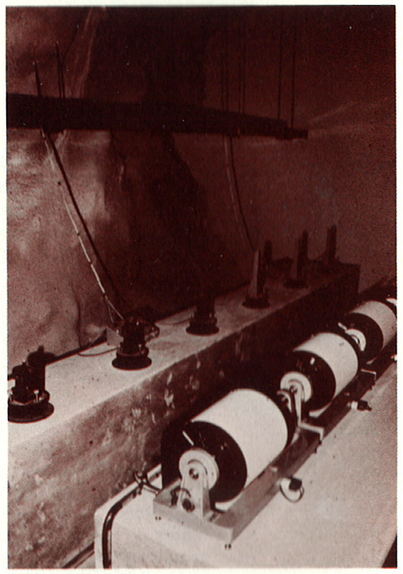
Requests for NCC products and services should be addressed to the National Climatic Center, Federal Building, Asheville, N.C. 28801, with checks made payable to Commerce, ESSA, NCC. Unit costs for some simple services have been established by the Department of Commerce and are given on page 18. For large or complex projects, NCC provides advance cost estimates. Work for Federal agencies is performed on a reimbursable basis, while advance payment is required from nongovernment organizations, private firms, or individual citizens.

If the job estimate is $500 or less, the estimate is the customer charge. For estimates exceeding $500, the actual cost of the job is charged. For work in this category, users other than Federal agencies establish individual trust funds. Private users with continuing needs for special climatological services sometimes make advance deposits to cover their requirements as they arise.









Signals of earthquake vibrations are picked up by the seismometers (above, left), amplified and recorded by the photosensitive drum recorders at upper right. Data from these worldwide standard seismograph stations are essential to understanding (and possibly preventing) the type of damage shown below, part of 1964 Alaska earthquake damage. That earthquake's "signature" appears at right.

The Seismological Data Center

Collocated with NCC in the Asheville facility, the Seismological Data Center is the archive and dissemination point for seismograms recorded by the 114 stations of the Worldwide Seismograph Network strategically located around the globe to monitor earthquakes, as well as those recorded at ESSA operated and cooperating stations. Each station records six components of earth vibration daily: the vertical and two horizontal components of both short-period (1.0-second) and long-period (15-second) seismic waves. All stations employ the same type of instrumentation, so their records are comparable. These are invaluable to research efforts to improve estimates of earthquake magnitudes, and to increase man's knowledge of the physical properties of the earth. As of January 1, 1970, there were approximately 1,500,000 seismograms on file, and an additional 250,000 were being received each year.

The primary activities of the Seismological Data Center are to microfilm, archive, retrieve, and disseminate seismograms from the Worldwide Network. The original seismograms measure 1 by 3 feet and are copied on 70-millimeter film at an approximate reduction of 8.2 to 1. They are also reduced to 35-millimeter film at a total reduction of 12.2 to 1 and retained in rolls. The 70-millimeter copies are cut into individual records called film chips and filed according to date, providing ready access to all records from the entire network for a particular day.

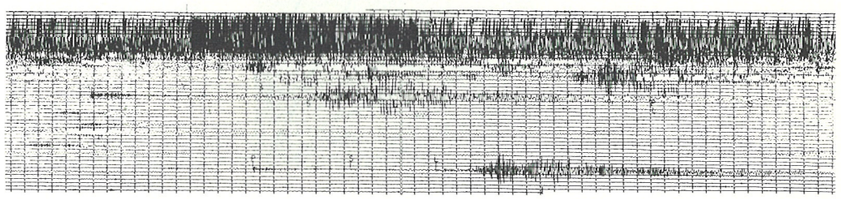
Copies of individual seismograms are available on either 70- or 35-millimeter film, or original size paper. Copies of the 35-millimeter roll film files are also available. Roughly 2 million film copies and about 22,000 paper copies are distributed annually. University and Government research scientists are the principal users. Five to 10 percent of the requests come from other countries.

A duplicate 70-millimeter seismogram file is maintained at ESSA's National Earthquake Information Center in Rockville, Md., for use by visiting scientists. Technical details concerning the instruments, seismograms, and the observation stations are also provided.

Although primarily concerned with seismograms from the worldwide network, the Data Center also provides copies of seismograms received from a 25 station Canadian network and has access to data collected for other Coast and Geodetic seismic programs, including those appearing in its epicenter publications.

Requests for film or paper copies of seismograms from the Worldwide Seismograph Network should be addressed to the Seismological Data Center, Federal Building, Asheville, N.C. 28801. The user should specify the stations, date, time, components, and format desired. Financial arrangements are identical to those of the National Climatic Center (see page 7), except that Federal agencies should address purchase orders and letters to this address, and other users should make their checks payable to Commerce, ESSA, Seismological Data Center.

Requests for seismic data other than standard network seismograms should be addressed to Chief, Earth Sciences Division, Environmental Data Service, 8060 13th Street, Silver Spring, Md. 20910.



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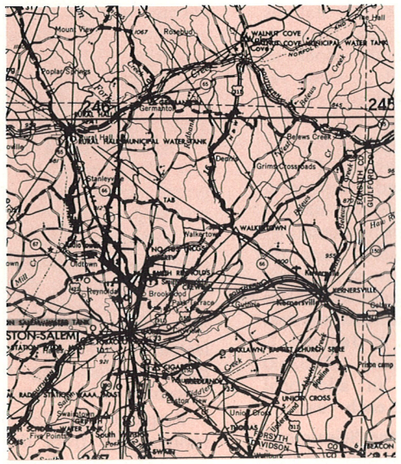
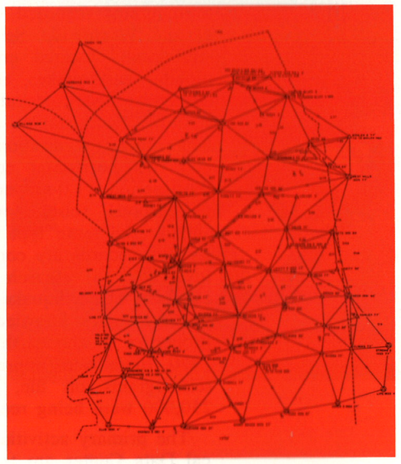




Geodetic survey teams have crossed and recrossed the continent with a high-precision network of horizontal and vertical control, the starting point for most extensive engineering and planning operations. Horizontal control surveys are often made from the stable Bilby steel tower, at left, to lift the surveyors' line of sight above obstructions. Geodetic data include horizontal control maps (above, left), which show both Coast and Geodetic Survey and Geological Survey networks, and large-scale triangulation schemes (above, right) for urban areas. These will have increasing importance as America tries to save her cities.

The Geodetic Data Center

The Geodetic Data Center, also located at Asheville, N.C., maintains and distributes U.S. geodetic control data established by the Coast and Geodetic Survey, other Federal and State agencies, and commercial firms. This facility also handles diagrams, indexes, and publications pertaining to the national control network,

Horizontal control surveys (triangulation and traverse) establish numerous marked points with known latitude and longitude. Vertical-control surveys (leveling) establish other marked points with known elevation. As of January 1, 1970, there were approximately 190,000 geographic positions (horizontal control stations) and 325,000 elevations (vertical control stations) on file. Geodetic information accumulates at a rate of about 8,000 stations per year. About 1.5 million data sheets are distributed annually, often eliminating the user's need to duplicate costly surveys.

Both adjusted and unadjusted data are disseminated by the Geodetic Data Center. Horizontal control data are published in lithoprint booklets. A booklet represents a a geographic quadrangle area of 30 minutes by 30 minutes (arc distances). Each sheet of the booklet describes an individual triangulation station within the area and lists the geodetic azimuth, plane azimuth, geodetic distance, and other engineering information. State plane coordinates are also given for use by local land surveyors, engineers, and planners.

Vertical control data (leveling) are furnished in two formats—30-minute quadrangle booklets, and leveling line booklets. Locations of the vertical control stations (benchmarks) are described in detail, with tabulated elevations adjusted to the Sea Level Datum of 1929 and given in both meters and feet. The National Leveling Network consists of approximately 500,000 miles of leveling.

The conversion program to quadrangles has not yet been completed, and control for some areas is still furnished in an earlier format.

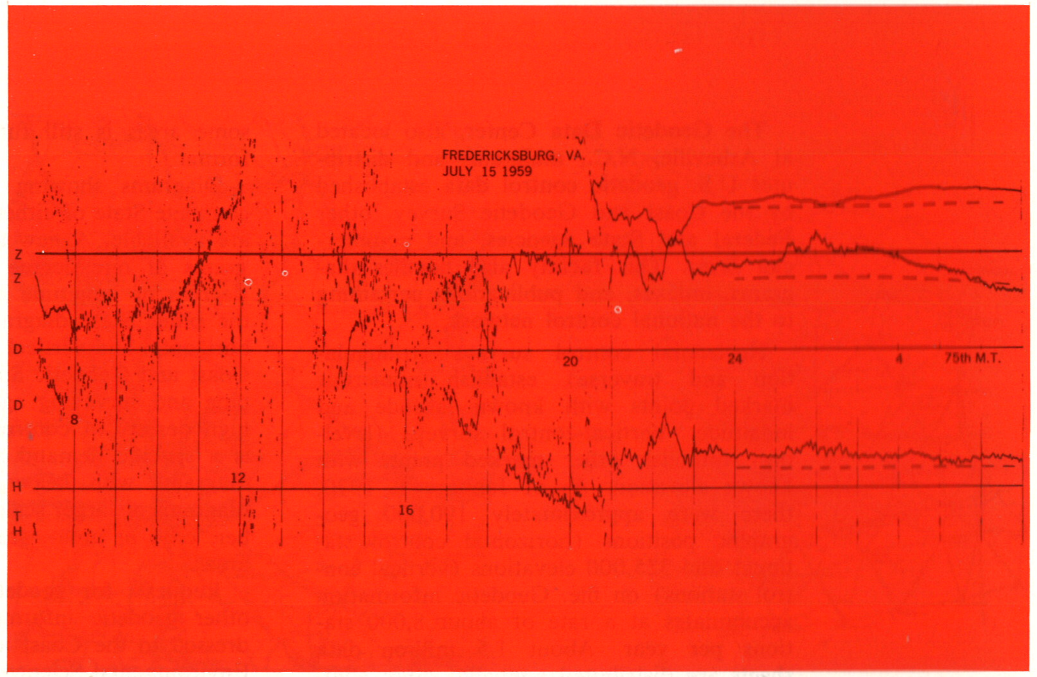
Diagrams showing the coverage for a complete State of either type of control data are available. A new series of control diagrams of one degree of latitude and two degrees of longitude is gradually replacing the older State diagrams, and shows both horizontal and vertical data collected by the Coast and Geodetic Survey and other mapping and surveying agencies. Areas with a high density of control or for which there is a specific demand are identified on the diagrams with heavy lines, and separate diagrams of larger scale—identified by number, city, or area—are published for these areas.

Requests for geodetic control data and other geodetic information should be addressed to the Coast and Geodetic Survey, Environmental Science Services Administration, Rockville, Md. 20852, Attention: C125. Most requests require research in records in Rockville to determine the status of new or revised data for the area of interest; if published material will satisfy the request, the Coast and Geodetic Survey will send the order to the Geodetic Data Center, which will mail the appropriate publication to the user.

Requests for control information should specify the State, county, general area, approximate geographic boundaries, and type of control desired, as well as the general nature of the user's project.

Requests are filled without prepayment if the cost is $15 or less. Prepayment is requested for orders exceeding $15, unless the user has completed an automatic mailing service agreement (Form C&GS-11A).

Automatic mailing services are provided to users with immediate and continuing needs for geodetic control data. By this service these users automatically receive data for their area of interest upon publication. A price list for geodetic data is published quarterly and furnished without charge to mailing list customers and to anyone else on request.



Interactions between solar radiation and the earth's magnetic field produced the bright auroral display at left, photographed near College Observatory, Alaska. The magnetogram shown above was made at the Fredericksburg, Va., geomagnetic observatory and is part of the mountain of geomagnetic data gathered by ESSA and other agencies. One use of this information is in the compilation of U.S. and world magnetic maps, like the isogonic map section at right.

The Geomagnetic Data Center

The Geomagnetic Data Center in Rockville, Md., archives and disseminates copies of magnetograms and tabulations of time variations in magnetic field from a worldwide network of geomagnetic observatories. Like the NCC, this Center is an official national repository and holds the largest volume of magnetic data of any center in the world. It is also one of four world data centers for geomagnetism.

Geomagnetic data are obtained from observations, repeat and distribution stations, marine surveys, airborne surveys, and satellites. Approximately 95 percent of the data in the Geomagnetic Data Center comes from observatories. Most nonobservatory data are not stored in the Center, but are made available to it by other ESSA units and other Government agencies such as the National Oceanographic Data Center and the National Aeronautics and Space Administration.

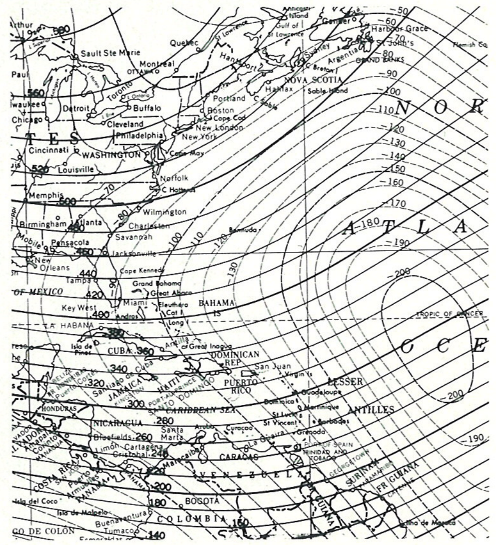
Observatory records consist primarily of magnetograms (analog traces of changes in the strength and direction of the earth's magnetic field) and the hourly mean values derived from them. Tables of K-indices (a three-hourly, quasi-logarithmic measure of activity) are also derived from the magnetograms and are available from most observatories.

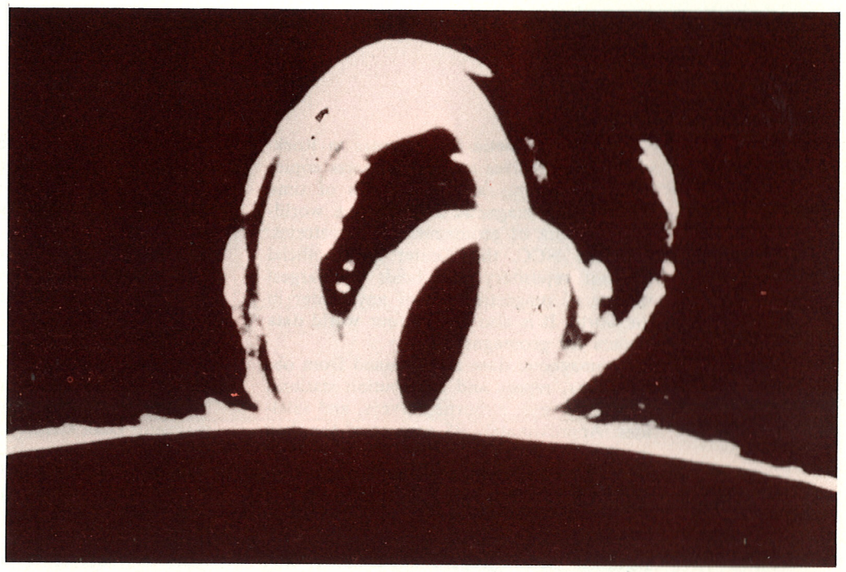
Since the beginning of the International Geophysical Year information has been received from about 300 observatories. Today approximately 185 observatories (including 14 operated by the Coast and Geodetic Survey) contribute to the Center. As of January 1, 1970, there were approximately one million magnetograms on file in the data center. The data accumulate at a rate of roughly 80,000 magnetograms a year, received from a month to several years after the recording period. Currently the Center disseminates about 250,000 copies a year to users, and the number grows rapidly.

A catalog showing the observatory project intervals for which geomagnetic records are available is published annually. The data are used by researchers in universities, government, and industry throughout the world for correlation with data in other disciplines and those obtained from satellites to construct magnetic charts, and to make secular change studies. Most of the data are on 35-millimeter roll film, and some are in observatory yearbooks and bulletins; much of the digital material is available on magnetic tape. By international agreement, copies are furnished to users at the cost of reproduction.

Requests should be addressed to the Geomagnetic Data Center, Environmental Data Service, Environmental Science Services Administration, Rockville, Md. 20852.

Most requests are filled within one week; large orders requiring commercial reproduction require two to three weeks. Payment is required in advance. For orders costing $500 or less, the data are provided at a fixed, predetermined cost. For orders estimated to cost more than $500, the charges are the actual costs incurred in preparing the data. Remittances should be made payable (in U.S. dollars) to the U.S. Department of Commerce, ESSA.





A solar flare sends out radiation which can be very disruptive to ionospheric radio systems. In addition to monitoring solar activity (and inadvertently getting unusual photographs like the one at right), the ESSA Research Laboratories measure ionospheric reflectivity. The ionograms, which are the records of radio-frequency soundings of the ionosphere, are stored in the racked film cans shown at left.

The Aeronomy and Space Data Center

The Aeronomy and Space Data Center (World Data Center A, Upper Atmosphere Geophysics) is a central repository for measurements, reports, and other information on solar-terrestrial physics. Located in ESSA's Space Disturbances Laboratory at Boulder, Colo., the Aeronomy and Space Data Center is responsible for ionosphere, solar activity, cosmic rays, airglow, instrumental aurora and visual auroral data, which it catalogs, stores, reproduces, and publishes. Some geomagnetic phenomena such as magnetospheric micropulsations, geomagnetic storm data, and magnetic indices—in particular the AE and Dst indices—are also on file at the Center.

Most of the data come from world sources under international exchange agreements. The rapidly expanding file contains more than 11 million feet of ionogram film, 800,000 feet of all-sky camera film, 2,500,000 sheets of graphical and numerical data, and additional information on magnetic tape from ESSA and ESSA-supplied stations and several hundred cooperating institutions.

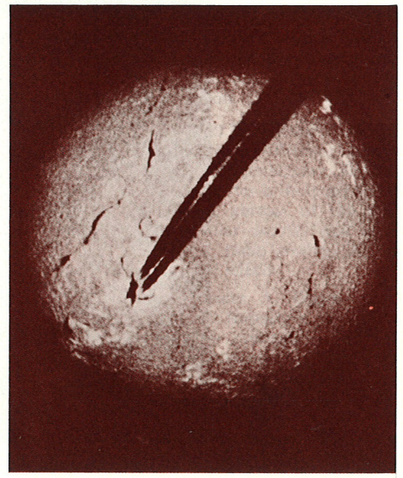
Ionosphere data available from worldwide sources include vertical incidence soundings—including hourly values of standard ionospheric parameters and selected f-plots and ionograms—topside soundings, electron density profiles, systematic observations of ionospheric absorption and drifts, atmospheric radio noise measurements, whistlers and very low frequency noise observations, and miscellaneous other categories.

Copies of the various data are available in suitable format. Many of the vertical incidence hourly values originally on punched cards have been transferred to magnetic tape. Median values of vertical incidence soundings are available as published in the monthly bulletin *Ionospheric Data* collated by ESSA's Institute for Telecommunications Sciences.

Solar activity data include those on solar flares, radio emission events (fixed frequency and radio spectra), sudden ionospheric disturbances used as indirect flare observations, and some satellite monitoring measurements of ultraviolet, x-ray, and particle emissions, and the solar wind. Also included are patrol data on calcium plages, solar magnetic fields, and chromospheric structure, various daily maps of the sun, and solar indices (sunspot numbers and radio flux measurements). Other data in the collections concern prominences, filaments, surges, and coronal emission.

Material in constant demand is published in the monthly periodical, *Solar Geophysical Data*. Much of the data on solar flares, solar radio emissions, and sudden ionospheric disturbances is on punched cards or magnetic tape, as well as copies of original tables or photographs.

Cosmic ray observations are made by the world network of ground-based stations with super neutron monitors, neutron monitors, cubical meson telescopes, ionization chambers, narrow angle telescopes, and non-synoptic shower apparatuses. Cosmic ray data are available on punched cards, magnetic tape, copies of original data tables, and microfilm.



Airglow data result from photometric observations in various wavelengths of the optical radiation from the night sky. Those listed in the World Data Center A catalog are zenith intensities at the observatory and ratios of intensities at equal angular distances north and south. Airglow data are available as copies of original data tables, punched cards, or computer printouts.

Auroral data consist mainly of all-sky photographs. Cameras are located mainly in the northern and southern auroral regions with a few in the subauroral belts. These data are supplemented by photographs taken from groups of associated stations to determine the position of auroras. Radar and spectrographic observations of the aurora are also made. Visual auroral data include "visoplots" and many types of collated data, such as Northern Hemisphere maps.

All-sky camera photographs are recorded on 16- or 35-millimeter film in rolls approximately 100 feet in length, supplemented by detailed indexes to the film available. Radar observations are on 16-millimeter film.

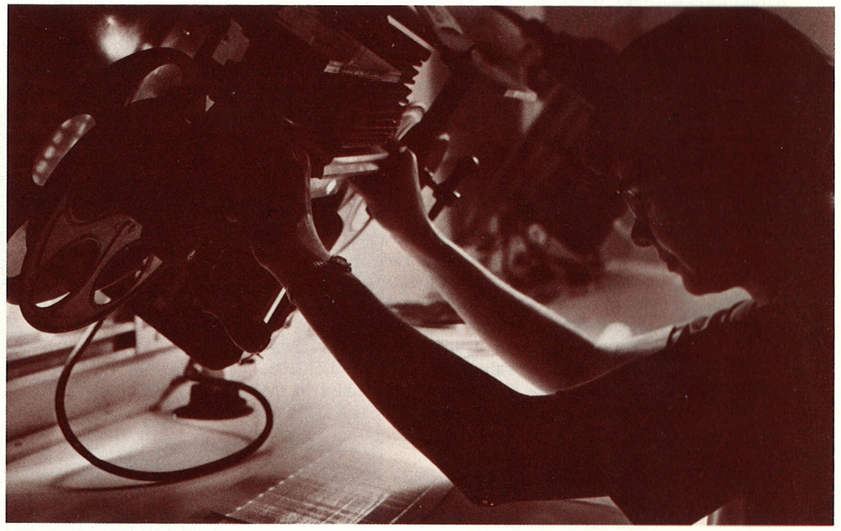
The Aeronomy and Space Data Center provides copies of data on request, either on an exchange basis or at the cost of reproduction. Costs are given in the World Data Center A *Catalogue of Data in Solar-Terrestrial Physics,* published by the National Academy of Sciences and available from the Center.

The Center publishes its upper atmosphere geophysical data on various time scales to meet the needs of researchers. It also plays a leading role in the international coordination of solar-terrestrial physics data activities. Visitors can consult data collections in the Center and make prior arrangements for the space and equipment to work with the material on the premises.

Domestic data users include ESSA, NASA, the Department of Defense, other Federal agencies, colleges, universities, and research organizations, industrial and consulting firms, commercial communications and power firms, and airlines.

Requests should be addressed to World Data Center A—Upper Atmosphere Geophysics, ESSA, Boulder, Colo. 80302, USA. Purchase orders or authorizing letters should state the type of information needed, stations, dates and local or universal time, and parameters or other specifications. Users requesting data on magnetic tape should provide such information as the kind of computers to be used.

All foreign orders must be paid in advance. Remittances should be made in U.S. dollars to the Environmental Science Services Administration and marked to the attention of World Data Center A, Upper Atmosphere Geophysics, Boulder, Colo. 80302.



At the Aeronomy and Space Data Center, an ionogram is projected for hand scaling.

Selected Data Publications

Climatology

All publications listed in this section except the *Mariners Weather Log* are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The *Log* is distributed by the Environmental Data Service, Silver Spring, Md.

Additional information on climatological publications is given in "Selective Guide to Published Climatic Data Sources," *Key to Meteorological Records Documentation No. 4.11,* available from the Superintendent of Documents.

Climatic Atlas of the United States is a 76-page, large format (16″ x 22″) collection of 231 maps, 21 graphs, and 13 tabulations depicting the climate of the United States in terms of the distribution and variation of temperature, precipitation, wind, barometric pressure, relative humidity, dewpoint, sunshine, sky cover, heating degree days, solar radiation, and evaporation.

Climates of the World is a 28-page brochure which presents temperature and precipitation data for approximately 800 stations throughout the world. It also includes brief descriptions of the climate of each continent, and maps showing the worldwide distribution of temperature and precipitation.

Daily Weather Map, Weekly Series is an 8-page periodical showing the daily progression of weather patterns across the United States for the previous week. A surface weather map, 500 millibar chart, highest and lowest temperature chart, and daily precipitation chart are provided for each day.

Local Climatological Data is a monthly publication issued separately for approximately 300 first-order Weather Bureau stations. It contains daily and monthly temperature data including cooling and heating degree days, dew point, precipitation including snowfall, pressure, wind, sunshine and sky cover, and, where available, solar radiation data.

Local Climatological Data with Comparative Data is an annual publication summarizing by month and for the year data for the same 300 locations. Tables of normals, means and extremes, average monthly and annual temperature, precipitation, snowfall, and heating degree days cover a long period of record for most stations.

Climatological Data is a monthly and annual publication issued separately for each State or combination of States. It contains summary information on temperature extremes and precipitation and includes evaporation, wind, relative humidity, sunshine, and soil moisture data for stations making these measurements.

Climatological Data, National Summary is issued monthly and annually and contains pressure, temperature, precipitation, solar radiation, and wind data for selected stations. It also contains a general summary of national weather conditions; special articles on hurricanes, unusual weather, and river and flood conditions; severe storm damage; and rawinsonde data.

Storm Data is issued monthly and gives the place, time, character, and estimated damage for all reported severe storms or unusual weather phenomena by States.

Climates of the States is issued for each State or combination of States and contains a local climatological data summary for each Weather Bureau station in the State, a freeze data table for 100-200 locations, and a narrative summary describing the climatological features of the State.

Monthly Climatic Data for the World contains monthly mean values of pressure, temperature, relative humidity, and precipitation at the surface, as well as height, temperature, dew point, and wind direction and speed data at standard constant pressure levels aloft for many selected stations throughout the world.

Climatic Summary of the United States (Bulletin W) is issued for each decade, covering separately each State or combination of States. It contains monthly total precipitation, mean temperature, and total snowfall, as well as averages for the entire period of record for 100-200 locations within each State. Normals are included for those stations having 30 or more years of continuous record.

World Weather Records is issued for each decade and contains tables of precipitation, mean temperatures, and mean pressures at stations throughout the world for which complete data for the period are available. Issues cover every 10-year period back to about 1900.

Weekly Weather and Crop Bulletin is prepared in cooperation with the U.S. Department of Agriculture and State agricultural agencies and is distributed from Washington, D.C., about noon each Tuesday. In addition to the narrative summaries of weather over the country during the previous week and its effect on crops, condensed summaries are furnished for each State. Summary tables of temperature, heating degree days, precipitation, and snow depth are included, as are drought analyses, special articles, and tables of special data of current importance.

Mariners Weather Log, issued bimonthly, includes feature articles on tropical cyclones and other subjects of current maritime meteorological interest in the North Atlantic and North Pacific Oceans and on the Great Lakes, selected gale observations, a climatic summary for the six U.S. Ocean Station Vessels, rough logs of general weather conditions prevailing over the North Atlantic and North Pacific Oceans during the three months preceding copy preparation, and smooth logs of conditions in these areas for the fourth and fifth months preceding copy preparation.

Catalog of Meteorological Satellite Data is published on an irregular basis, with each issue providing a narrative introduction and a set of daily hemispheric computer produced composite photographs (ESSA satellites) or handdrawn cloud analyses (TIROS series) for the period of record showing the areas included in the various picture sequences. A table of satellite positions for each picture sequence is also included.

Geophysical Data

The following publications are also available through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Solar Geophysical Data is issued monthly in two parts, "Part I—Prompt Reports" and "Part II—Comprehensive Reports." The publication series is designed to keep research workers abreast of the major particulars of solar activity and associated ionospheric, radio propagation, and other geophysical effects.

World Data Center A, Upper Atmosphere Geophysics Reports is an irregular series of reports concerning the solar terrestrial environment and interplanetary space. Typical reports include refined data on solar flares, IQSY air glow data tables, abbreviated calendar records, and data on special solar events.

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